

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P545 (B1845)

Delayed neutrons are neutrons that...

- A. have reached thermal equilibrium with the surrounding medium.
- B. are born as thermal neutrons.
- C. are born at a lower average kinetic energy than most other fission neutrons.
- D. are responsible for the majority of U-235 fissions.

ANSWER: C.

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P845 (B1945)

Delayed neutrons are the neutrons that...

- A. have reached thermal equilibrium with the surrounding medium.
- B. are born within 10^{-14} seconds of the fission event.
- C. are produced from the radioactive decay of certain fission fragments.
- D. are responsible for the majority of U-235 fissions.

ANSWER: C.

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P1145 (B1545)

Which one of the following is a characteristic of a prompt neutron?

- A. Born with an average kinetic energy of 0.5 MeV.
- B. Usually emitted by the excited nucleus of a fission product.
- C. Accounts for more than 99% of fission neutrons.
- D. Released an average of 13 seconds after the fission event.

ANSWER: C.

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P1245 (B2846)

In a comparison between a delayed neutron and a prompt neutron born from the same fission event, the delayed neutron is more likely to... (Assume that each neutron remains in the reactor core.)

- A. cause fission of a U-238 nucleus.
- B. cause fission of a U-235 nucleus.
- C. travel to an adjacent fuel assembly.
- D. experience resonance absorption in the core.

ANSWER: B.

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P1445 (B1345)

A neutron that is born 10^{-2} seconds after the associated fission event is a _____ neutron.

- A. thermal
- B. delayed
- C. prompt
- D. capture

ANSWER: B.

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P1545 (B1345)

A neutron that is born 10^{-6} seconds after the associated fission event is a _____ neutron.

- A. thermal
- B. delayed
- C. prompt
- D. capture

ANSWER: B.

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P1945 (B1146)

Which one of the following types of neutrons has an average neutron generation lifetime of 12.5 seconds?

- A. Prompt
- B. Delayed
- C. Fast
- D. Thermal

ANSWER: B.

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P2045 (B2046)

In a comparison between a delayed neutron and a prompt neutron born from the same fission event, the prompt neutron is more likely to...

- A. require a greater number of collisions to become a thermal neutron.
- B. be captured by U-238 at a resonance energy peak between 1 eV and 1000 eV.
- C. be born with a lower kinetic energy.
- D. cause thermal fission of a U-235 nucleus.

ANSWER: A.

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P2145 (B2145)

In a comparison between a delayed neutron and a prompt neutron born from the same fission event, the prompt neutron is more likely to...

- A. cause fast fission of a U-238 nucleus.
- B. be captured by a U-238 nucleus at a resonance energy between 1 eV and 1000 eV.
- C. be captured by a Xe-135 nucleus.
- D. cause thermal fission of a U-235 nucleus.

ANSWER: A.

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P2345 (B2345)

A neutron that is released 10^{-10} seconds after the associated fission event is classified as a _____ fission neutron.

- A. delayed
- B. prompt
- C. thermal
- D. spontaneous

ANSWER: A.

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P2445 (B3345)

As compared to a prompt neutron, a delayed neutron, born from the same fission event, requires _____ collisions in the moderator to become thermal and is _____ likely to cause fission of a U-238 nucleus. (Neglect the effects of neutron leakage.)

- A. more; more
- B. more; less
- C. fewer; more
- D. fewer; less

ANSWER: D.

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P2545 (B2545)

In a comparison between a delayed neutron and a prompt neutron born from the same fission event, the prompt neutron is more likely to...

- A. leak out of the core while slowing down.
- B. be captured by a U-238 nucleus at a resonance energy.
- C. be captured by a Xe-135 nucleus.
- D. cause thermal fission of a U-235 nucleus.

ANSWER: A.

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P2645 (B2645)

In a comparison between a delayed neutron and a prompt neutron born from the same fission event, the delayed neutron is more likely to...

- A. leak out of the core.
- B. cause fission of a U-238 nucleus.
- C. become a thermal neutron.
- D. cause fission of a Pu-240 nucleus.

ANSWER: C.

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P2845 (B3145)

During a brief time interval in a typical commercial nuclear reactor operating at the beginning of a fuel cycle, 10^3 delayed neutrons were emitted.

Approximately how many prompt neutrons were emitted during this same time interval?

- A. 1.5×10^5
- B. 6.5×10^6
- C. 1.5×10^7
- D. 6.5×10^8

ANSWER: A.

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P2945 (B2945)

Which one of the following types of neutrons in a reactor is more likely to cause fission of a U-238 nucleus in the reactor fuel? (Assume that each type of neutron remains in the reactor core until it interacts with a U-238 nucleus.)

- A. Thermal neutron
- B. Prompt fission neutron from birth
- C. Delayed fission neutron from birth
- D. Neutron at a U-238 resonance energy

ANSWER: B.

TOPIC: 192001
KNOWLEDGE: K1.02 [2.4/2.5]
QID: P3545 (B3545)

During a brief time interval in a typical commercial nuclear reactor operating at the beginning of a fuel cycle, 10^5 delayed neutrons were emitted.

Approximately how many prompt neutrons were emitted in the reactor during this same time interval?

- A. 1.5×10^5
- B. 6.5×10^6
- C. 1.5×10^7
- D. 6.5×10^8

ANSWER: C.